



## **United States Standards for Grades of Fresh and Frozen Shrimp**

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### **Scope and product description**

These Standards for Grades apply to clean wholesome shrimp that are fresh or frozen, raw or cooked, and are implemented in accordance with additional guidance set forth in Part II of NOAA Handbook 25. "Inspector's Instructions for Grading Fresh and Frozen Shrimp." Copies of the Instructions may be obtained from the Seafood Inspection Program, DASS, P.O. Drawer 1207, 3207 Frederic Street, Suite B, Pascagoula, MS, 39568-1207.

### **Product forms**

#### **(a) Types.**

- (1) Chilled, fresh (not previously frozen).
- (2) Unfrozen, thawed (previously frozen).
- (3) Frozen individually (IQF), glazed or unglazed.
- (4) Frozen solid pack, glazed or unglazed.

#### **(b) Styles.**

- (1) Raw (uncoagulated protein).
- (2) Blanched (parboiled) - heated for a period of time such that the surface of the product reaches a temperature adequate to coagulate the protein.
- (3) Cooked - heated for a period of time such that the thermal center of the product reaches a temperature adequate to coagulate the protein.

#### **(c) Market Forms.**

- (1) Heads on (head, shell, tail fins on).
- (2) Headless (only head removed; shell, tail fins on).
- (3) Peeled, undeveined, round, tail on (all shell removed except last shell segment and tail fins, with segments unslit).
- (4) Peeled, undeveined, round, tail off (all shell and tail fins removed, with segments unslit).
- (5) Peeled and deveined, round, tail on (all shell removed except last shell segment and tail fins, with segments shallowly slit to last segment).
- (6) Peeled and deveined, round, tail off (all shell and tail fins removed, with segments shallowly slit to last segment).
- (7) Peeled and deveined, fantail or butterfly, tail on (all shell removed except last shell segment and tail fins, with segments deeply slit to last segment).
- (8) Peeled and deveined, fantail or butterfly, tail off (all shell and tail fin removed, with segments deeply slit to last segment).
- (9) Peeled and deveined, western (all shell removed except last shell segment and tail fins, with segments split to fifth segment and vein removed to end of cut).
- (10) Other forms of shrimp as specified and so designated on the label.

### **Grades**

#### **(a) U.S. Grade A shrimp shall:**



- (1) Possess good flavor and odor characteristics of the species being evaluated in accordance with Grade Determination of this subpart and
- (2) Comply with the limits for defects for U.S. Grade A quality in accordance with Grade Determination(g) of this subpart.

(b) U.S. Grade B shrimp shall:

- (1) Possess reasonably good flavor and odor characteristics of the species being evaluated in accordance with Grade Determination of this subpart: and
- (2) Comply with the limits for defects for U.S. Grade B quality in accordance with Grade Determination(g) of this subpart.

### **Grade determination**

(a) Procedures for grade determination. Shrimp are evaluated for odor and flavor in accordance with paragraph (d) of this section. Shrimp are evaluated for physical characteristics, defects, and uniformity of size in accordance with paragraph (e) of this section.

(b) Sampling. Lot size, number of sample units, and acceptance numbers shall be in accordance with the regulations governing processed fishery products, 50 CFR 260.61, Table II, V or VI, whichever is applicable. For examination of physical defects, the sample unit will be one or more packages sufficient to provide the amounts as follows:

- (1) For shrimp under 70 count per pound (0.45 kg), a representative 2-pound (0.91 kg) sample unit will be used.
- (2) For shrimp 70-250 count per pound (0.45 kg), a representative 1-pound (0.45 kg) sample unit will be used.
- (3) For shrimp over 250 count per pound 0.45 kg), a representative 8 ounce (0.23 kg) sample unit will be used.

(c) Count. "Count", or number of shrimp per pound (0.45 kg), is determined by dividing the number of whole shrimp in a sample unit by the adjusted weight in pounds (kilograms).

- (1) Adjusted weight means the weight of all of the whole shrimp in the sample unit.
- (2) Adjusted count means the number of shrimp comprising the adjusted weight.

(3) If the count or number of shrimp per pound (0.45 kg) of a sample unit does not conform to the declared count that sample unit is a deviant. A lot has the declared count if the number of deviant sample units does not exceed the acceptance number prescribed for its sample size in Part 260 of this subchapter. If the number of deviant sample units exceeds the acceptance number for its sample size, it is marked as a mixed lot and it is not graded.

(d) Evaluation of flavor and odor.

- (1) Definitions of flavor and odor.



- (i) Good flavor and odor (essential requirements for a U.S. Grade A product) means that the raw product and the cooked product have the normal, pleasant flavor and odor characteristic(s) of freshly caught shrimp that is free from off-flavors and odors of any kind. A natural odor or flavor reminiscent of iodoform is acceptable.
- (ii) Reasonably good flavor and odor (minimum requirements for U.S. Grade B shrimp) means that the product may be somewhat lacking in good flavor and odor characteristics of freshly caught shrimp, but is free from objectionable off-flavors and off-odors of any kind.

(2) Procedures.

- (i) Raw styles of shrimp are evaluated for flavor and odor in the cooked state. Raw odor is also evaluated in the fresh or thawed state.
- (ii) Cooked styles of shrimp are evaluated for flavor and odor without further cooking, if fresh, or after thawing, if frozen.

(e) Definitions of defects.

Each sample unit is evaluated for its physical characteristics and defects in accordance with the following definitions. Detailed descriptions of defects are in Part II of NOAA Handbook 25. "Inspector's Instructions for Grading Fresh or Frozen Shrimp".

(1) Examination in the frozen state.

- (i) Dehydration refers to a general drying of the shrimp flesh that is noticeable after any glaze and shell are removed. It includes any detectable change from the normal characteristic, bright appearance of freshly caught, properly iced or properly processed shrimp.
  - (a) *Slight* dehydration means scarcely noticeable drying of the shrimp flesh that will not affect the sensory quality of the sample.
  - (b) *Moderate* dehydration means conspicuous drying of the shrimp flesh that will not seriously affect the sensory quality of the sample.
  - (c) *Excessive* dehydration means conspicuous, drying that will seriously affect the sensory quality of the sample.

(ii) [Reserved]

(2) Examination in the fresh or thawed state.

- (i) Uniformity of size refers to the degree of uniformity of the shrimp in the container to determine their conformity to the declared count. The product shall be evaluated in the fresh or thawed state for uniformity of size as follows:
  - (a) From the adjusted sample unit (all whole, unbroken, undamaged shrimp in the sample unit) visually select and weigh not more than 10 percent by count, but not less than one, of the largest shrimp.
  - (b) Visually select and weigh not more than 10 percent by count, but not less than one, of the smallest shrimp.
  - (c) Divide the weight of the large shrimp by the weight of the small shrimp and the result will be the uniformity ratio.
- (ii) Black spots, improperly headed (throats), and improperly cleaned ends refer to the presence of any objectionable black or darkened area that affects the desirability or sensory quality of the shrimp, whether the market form is shell-on or peeled. Objectionable black spot refers to more than three instances of penetrating black spot that is visible but difficult to measure because of its small size (approximately the size of a pencil point): or any areas larger than a pencil point

that penetrates the flesh: or aggregate areas of non-penetrating surface black spot on the shell or membrane that is equal to or greater than the area of the smallest segment. Assessments are made on individual shrimp. “Throats” are those portions of flesh and/or extraneous material from the head (cephalothorax) that remain attached to the first segment after heading.

- (iii) Pieces of shrimp, broken or damaged shrimp
  - (a) Shrimp pieces. “Piece” means for a count of 70 or less unglazed shrimp per pound (0.45 kg), any shrimp that has fewer than five segments, with or without tail fins attached: or, for a count of more than 70 unglazed shrimp per pound (0.45 kg), any shrimp that has fewer than four segments: or, any whole shrimp with a break in the flesh greater than  $\frac{1}{8}$  of the thickness of the shrimp where the break occurs.
  - (b) Broken shrimp means a shrimp having a break in the flesh greater than  $\frac{1}{8}$  of the thickness of the shrimp.
  - (c) Damaged shrimp means a shrimp that is crushed or mutilated so as to materially affect its appearance or usability.
- (iv) Unusable material includes the following:
  - (a) Legs refer to walking legs only, whether attached or not attached to the body (heads-on market from excepted).
  - (b) Loose shell and antennae are any pieces of shell or antennae that are completely detached from the shrimp.
  - (c) Flipper refers to any detached tail fin with or without the last shell segment attached, with or without flesh inside.
  - (d) Extraneous material means any harmless material in a sample unit that is not shrimp material.
- (v) Unacceptable shrimp and heads.
  - (a) Unacceptable shrimp refers to abnormal or diseased shrimp.
  - (b) Head refers to the cephalothorax, except for heads-on shrimp.
- (vi) Inadvertently peeled and improperly peeled shrimp refer to the presence or absence of head, shell segment, swimmeret, or tail fin, which should or should not have been removed of certain market forms as described in Product Forms of this subpart. (Shell-on shrimp with tail fins and/or telson missing is “inadvertently peeled”, but if the last segment of flesh is missing, the shrimp is damaged”).
- (vii) Improperly deveined shrimp refers to the presence of dark vein (alimentary canal) containing sand or sediment or roe that should have been removed for peeled and deveined market forms as described in ‘265.102 (c) of this subpart. For shrimp of 70 count per pound (0.45 kg) or less, aggregate areas of dark vein or roe is a defect that are longer than one segment is a defect. For shrimp of 71 to 500 count per pound (0.45 kg), aggregate areas of dark vein or roe defect that are longer than two segments are a defect.

NOTE: THIS DOES NOT PERTAIN TO THE LAST SEGMENT. FOR SHRIMP OF OVER 500 COUNT PER POUND (0.45 KG), DARK VEIN OR ROE OF ANY LENGTH IS NOT A DEFECT.

### (3) Examination in the cooked state

- (i) Texture. The texture of cooked shrimp should be firm, slightly resilient but not tough, moist but not mushy. Texture as a defect refers to an undesirable toughness, dryness or mushiness that deviated from the normal characteristics of the species when freshly caught, properly processed, and cooked.

- (a) *Slight*. Slightly tough, dry but not mushy.
  - (b) *Moderate*. Moderately tough, dry or mushy.
  - (c) *Excessive*. Excessively tough, very dry or very mushy.
- (ii) [Reserved]

(f) Listing defect points. When a sample unit is examined for physical defects, using the list of defect definitions in paragraph (e) of this section, defects are noted and numerical values are assigned in accordance with Table I of this subpart. The numbers assigned to defects in Table I of this subpart are points. The defect points are added together. The final total number of defect points is used to determine a sample unit grade. The scoring system is based on a perfect score of zero (no physical defects).

(g) Grade assignment.

- (1) Each sample unit will be assigned its grade in accordance with the limits for defects summarized as follows:

Grade assignment	Flavor and odor	Maximum number of defect points
U.S. Grade A	Good	15
U.S. Grade B	Reasonably Good	30

- (2) If a sample unit has been assigned different grade levels for flavor and odor and number of defect points, the sample unit grade will be the lower grade level.

### Tolerances for lot certification

The grades of specific lots shall be certified in accordance with 50 CFR §§260.21 and 260.61. In §260., the four score points are additive, not subtractive.

### Hygiene

All lots to be assigned a grade will be processed and maintained in accordance with 50 CFR §§260.98 to 260.104, and with the Good Manufacturing Practice regulations contained in 21 CFR part 110.

### Methods of analysis

Product samples will be analyzed in accordance with the “Official Methods of Analysis” of the Association of Official Analytical Chemists. (AOAC), 16th Edition (1999) as described this section. Copies of the AOAC methods may be obtained from AOAC International, Customer Services, 481 N. Frederick Avenue, Suite 500, Gaithersburg, MD, 20877-2417 USA.

### 35.1.04 AOAC OFFICIAL METHOD 976.16 COOKING SEAFOOD PRODUCTS

Cooking procedure is based on heating product to internal temperature of >160 EF (70EC). Cooking times vary according to size of product and equipment used. To determine cooking time, cook extra sample using a temperature measuring device with probe of known length to determine internal



temperature. Cooking equipment, including cooking oil for deep fat frying, shall be free from substances which interfere with sensory evaluation of cooked product.

Methods of heating product include, but are not limited to, baking, bake-in-foil, broiling, boil-in-bag, shallow pan frying, deep fat frying, oven frying, grilling, poaching, steaming, and microwave heating.

#### **42.3.01 AOAC OFFICIAL METHOD 963.26 NET CONTENTS OF FROZEN FOOD CONTAINERS-UNGLAZED FOODS**

(A) Apparatus.

- (a) For packages up to 5 pounds (2.27 kg), use scale of adequate capacity with sensitivity of 0.01 oz. (0.28 g).
- (b) For packages over 5 pounds (2.27 kg), use scale of adequate capacity with sensitivity of 0.025 oz. (0-71 g).

(B) Procedure. Set scale on firm support and level. Adjust 0 load indicator or rest point and check sensitivity. Remove package from low temperature storage, remove frost and ice from outside of package, and weigh immediately (W). Open package; remove contents, including any product particles and frost crystals. Air-dry empty package at room temperature and weigh (E). Weight of contents=W-E.

#### **35.1.02 AOAC OFFICIAL METHOD 963.18 NET CONTENTS OF FROZEN SEAFOODS GLAZED FOODS**

Set scale, -963.26A (see 42.3.01) on firm support and level. Adjust 0 load indicator or rest point and check sensitivity.

- (a) Remove package from low temperature storage, open immediately and place contents under gentle spray of cold water. Agitate carefully so product is not broken. Spray until all ice glaze that can be seen or felt is removed. Transfer product to circular No. 8 sieve, 20 cm (8") diameter for packages #0.9 kg (2 lb) and 30 cm (12") for packages >0.9 kg (2 lb). Without shifting product, incline sieve at angle of 17-20° to facilitate drainage and drain exactly 2 min. (stopwatch). Immediately transfer product to tared pan (B) and weigh (A). Weight of product=A-B.

#### **35.1.08 AOAC OFFICIAL METHOD 967.13 DRAINED WEIGHT OF FROZEN SHRIMP AND CRABMEAT**

(A) Apparatus.

- (a) Container - Wire mesh basket large enough to hold contents of one package and with openings small enough to retain all pieces. Expanded metal test-tube basket or equivalent, fully lined with standard 16 mesh per linear inch (2.54 cm) insect screen is satisfactory.
- (b) Balance - Sensitive to 0.25 g or 0.01 oz.
- (c) Sieves - U.S. No. 8, 20 cm (8") and 30 cm (12").

(B) Determination. Place contents of individual package in wire mesh basket and immerse in 15 L (4-gal.) container of fresh water at  $26 \pm 3^{\circ}\text{C}$  ( $80 \pm 5^{\circ}\text{F}$ ) so that top of basket extends above water level. Introduce water of same temperature at bottom of container at flow rate of 4-11 L (1-3 gal.)/min. As soon as

product thaws, as determined by loss of rigidity, transfer all material to 30 cm (12") (for packages 450 g [1 lb.]), or 20 cm (8") (for packages ≤450 g [1 lb.]) No. 8 sieve, distributing evenly. Without shifting material on sieve, incline sieve to ca 30° from horizontal to facilitate drainage. Two minutes from time placed on sieved, transfer product to previously weighed pan, and weigh. Weight so found minus weight of pan is drained weight of product.

The Administrator of the AOAC will evaluate alternative methods of analysis to determine their acceptability bases on their accuracy, repeatability, reproducibility, and lowest level of reliable measurement, as demonstrated by at least six laboratories.

**TABLE 1. - DEFECT TABLE**

[Size of sample unit is given in Grade Determination (b)]

COUNT OF SHRIMP PER POUND:	DEFECT POINT ASSIGNED				
	UP TO 40	41-70	71-130	131-500	OVER 500
NAME OF DEFECT					
1. Dehydration					
Slight .....	3	3	3	3	3
Moderate .....	8	8	8	8	8
Excessive .....	16	16	16	16	16
2. Uniformity of size:					
Weight ratio .....	1.75-2.00	1.75-2.00	2.00-4.00	2.5-5.00	(1)
Defect points .....	4	4	4	4	(1)
Weight ratio .....	2.01-2.50	2.01-2.50	4.01-6.00	5.0-7.00	(1)
Defect points .....	8	8	8	8	(1)
Weight ratio .....	>2.50	>2.50	>6.00	>7.00	(1)
Defect points .....	16	16	16	16	
3. Black spots, throats, and improperly cleaned ends:					
Percent by weight .....	1.00-4.00	1.00-4.00	2.00-6.00	2.00-6.00	2.00-6.00
Defect points .....	3	3	3	3	3
Percent by weight .....	4.01-8.00	4.01-8.00	6.01-10.00	6.01-10.00	6.01-10.00
Defect points .....	5	5	5	5	5
Percent by weight .....	8.01-16.00	8.01-16.00	10.01-20.00	10.01-20.00	10.01-20.00
Defect points .....	16	16	16	16	16
Each additional percent by weight .....	8.00	8.00	10.00	10.00	10.00
Defect points .....	16	16	16	16	16
4. Pieces, damaged shrimp, and broken shrimp:					
Percent by weight .....	1.50-2.00	2.00-4.00	2.00-4.00	7.00-9.00	11.01-22.00
Defect points .....	4	4	4	4	16
Percent by weight .....	2.01-4.00	4.01-6.00	4.01-7.00	9.01-11.00	(1)
Defect points .....	8	8	8	8	(1)
Percent by weight .....	4.01-8.00	6.01-12.00	7.00-14.00	11.01-22.00	(1)
Defect points .....	16	16	16	16	(1)
Each additional percent by weight .....	4.00	6.00	7.00	11.00	11.00
Defect points .....	16	16	16	16	16
5. Unuseable material (legs, loose shell, antennae, flippers, or extraneous material):					
Percent by weight .....	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2
Defect points .....	6	6	6	6	6
Percent by weight .....	0.21-0.4	0.21-0.4	0.21-0.4	0.21-0.4	0.21-0.4
Defect points .....	16	16	16	16	16
Each additional percent by weight .....	0.2	0.2	0.2	0.2	0.2
Defect points .....	16	16	16	16	16





COUNT OF SHRIMP PER POUND:	DEFECT POINT ASSIGNED				
	UP TO 40	41-70	71-130	131-500	OVER 500
NAME OF DEFECT					
6. Unacceptable shrimp and heads:					
Percent by weight .....	1.00-2.50	1.00-2.50	1.00-2.50	1.00-2.50	1.00-2.50
Defect points .....	3	3	3	3	3
Percent by weight .....	2.51-5.00	2.51-5.00	2.51-5.00	2.51-5.00	2.51-5.00
Defect points .....	6	6	6	6	6
Percent by weight .....	5.01-10.00	5.01-10.00	5.01-10.00	5.01-10.00	5.01-10.00
Defect points .....	16	16	16	16	16
Each additional percent by weight .....	5.0	5.0	5.0	5.0	5.0
Defect points .....	16	16	16	16	16
7. Improperly peeled and inadvertently peeled shrimp:					
Percent by weight .....	2.00-6.00	2.00-6.00	4.00-9.00	7.00-12.00	12.00-17.00
Defect points .....	3	3	3	3	8
Percent by weight .....	6.01-10.00	6.01-10.00	9.01-14.00	12.01-17.00	17.01-34.00
Defect points .....	8	8	8	8	16
Percent by weight .....	10.01-20.00	10.01-20.00	14.01-28.00	17.01-34.00	( <sup>1</sup> )
Defect points .....	16	16	16	16	( <sup>1</sup> )
Each additional percent by weight .....	10.00	10.00	14.00	17.00	17.00
Defect points .....	16	16	16	16	16
8. Improperly deveined shrimp:					
Percent by weight .....	1.00-3.00	1.00-6.00	6.00-9.00	6.00-11.00	( <sup>1</sup> )
Defect points .....	3	3	3	3	( <sup>1</sup> )
Percent by weight .....	3.01-5.00	6.01-10.00	9.01-12.00	12.01-20.00	( <sup>1</sup> )
Defect points .....	8	8	8	8	( <sup>1</sup> )
Percent by weight .....	5.01-10.00	10.01-20.00	12.01-24.00	20.01-40.00	( <sup>1</sup> )
Defect points .....	16	16	16	16	( <sup>1</sup> )
Each additional percent by weight .....	5.00	10.00	12.00	20.00	( <sup>1</sup> )
Defect points .....	16	16	16	16	( <sup>1</sup> )
<b>COOKED STATE</b>					
9. Texture:					
Slight .....	2	2	2	2	2
Moderate .....	5	5	5	5	5
Excessive .....	16	16	16	16	16

(<sup>1</sup>)Does not apply.